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TECHNICAL EDUCATION

BULLETIN No. 2

relating

to

Night Class
Instruction

in

Mining Centres



DEPARTMENT OF EDUCATION

PROVINCE OF ALBERTA

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Introduction

The "Schedule of Grants in Aid of Technical Education" recently announced by the Minister of Education includes among others, a provision of special importance to those interested in night class instruction in mining centres. In that part of the schedule dealing with night classes the following provision is made:

(a) In any school district including a city, town or village in which fewer than 30 teachers are employed; or in any other school district that has obtained permission from the Minister to establish night class instruction:

(1) To the school board, (a) When night class instruction in only the ordinary school branches is provided: An annual grant equal to 40 per cent. of the cost of tuition up to a maximum grant of \$100; (b) When night class instruction in vocational and technical subjects in addition to that in the ordinary school branches is provided: An annual grant equal to 50 per cent. of the cost of tuition up to a maximum grant of \$250.

PAYMENT OF GRANTS.

1. The grants for the encouragement of instruction in the subjects and courses indicated in the schedule are payable only when the organization, accommodation, equipment, courses of instruction, instructors and supervisors have been approved by the Minister of Education. If the provisions made by the school board and the character of the instruction be not fully satisfactory and if there be sufficient evidence of a *bona fide* effort to bring them up to standard the Minister may authorize the payment of such portion of the grant, as in his discretion, he may determine. The grants indicated in the schedule shall be subject to such *pro rata* increase or decrease as the amount available for such grants may permit or require.

2. In order to have the quality of instruction maintained at a high standard the instructors and supervisors of the subjects and courses of instruction affected by the said grants must hold such certificates and meet such requirements as the Minister may prescribe.

3. To insure that unity of purpose and effort necessary to secure the fullest and most economical use of all accommodation, equipment and specialized service available the courses and classes affected by these grants shall form an integral part of the school

system under the control of the school board and shall be under the general direction and supervision of the superintendent of schools in those school districts where such an official is employed by the board and in all other cases under the direction of a principal to be designated as the supervising principal of the schools of the district.

4. The school board shall cause to be prepared and transmitted to the Department of Education within thirty days after the close of each calendar year an annual report and such other reports as may be required by the Minister from time to time. Such reports shall be in form prescribed by the Minister.

5. In regard to night class instruction the schedule of grants shall be deemed in force on and after October 1, 1914. The schedule as a whole shall become operative on and after January 1, 1915.

COURSES OF INSTRUCTION

In order to assist and guide those locally responsible for the night class instruction in mining centres the following approved courses have been outlined. The courses have been planned to meet the needs of the community in a real and practical way. The preparatory courses are essential for any student who hopes to make satisfactory progress in the coal-mining courses. While preparing specifically for the miner's examinations the courses in coal mining should not be made wholly subservient to this end. Efficiency as miners is the real purpose to be kept in view. The classes in English for the non-English speaking should be found in every centre where there is a sufficient need to justify their organization.

A.—Courses in English for the Non-English Speaking.

Instruction in English, oral and written, to assist those who are unable to use the language to gain at least a working knowledge of the same. The Berlitz method of instruction is recommended but its use is not compulsory.

B.—Preparatory Courses.

1. *English*: Neat and legible writing; spelling; and facility in the correct use of the vocabulary of the miner; correction of grammatical errors; the building of sentences and paragraphs; simple description and narration relating to mines and mine operating; personal and business letters; practice in formulating and writing answers to examination questions.

2. *Mathematics*: Fundamental processes; factoring; greatest common divisor and least common multiple; fractions—common, vulgar and decimal; square and cube root; mensuration; simple algebraic processes; solving simple equations; quadratic equations; trigonometric functions; solution of triangles; transpositions and substitution in formulæ such as those used in theory of ventilation, discharge of pipes, etc.; elementary surveying and levelling.

3. *Mechanics and Elementary Applied Science*: Discussion and measurement of physical qualities; principles of dynamics, their application to practical problems; properties of matter; elementary statics; harmonic motion; motion of crank and connecting rod; friction; calculation of moments of inertia, rotation, elasticity; energy and its transformations; electricity and electrical quantities, gases, explosives, fuels, steam, chemistry of the coal mine and coke oven, machine construction; reading of blue prints and drawing of simple plans to rule.

C.—Courses in Coal Mining.

1. Preparation for Position of Fire-Boss Standing—Third Class Certificates:

a. Methods of supporting roof and sides under various conditions. Proper angle to set props; boring against old workings; shot-firing.

b. Ventilation: The properties, identification and proper estimation of gases met with in mines. Natural and artificial ventilation. The distribution and control of the air underground. Construction, use and testing of safety-lamps.

c. Explosions in mines; underground fires and inundations, their causes and prevention; rescue operations, apparatus and organization.

d. The use of electricity from point of view of safety in coal mines.

e. The Mines Act and Rules.

2. Preparation for Pit-Boss Standing—Second Class Certificates:

a. Systems of laying out and working under varying circumstances, of coal and other stratified deposits included under The Mines Act. Methods of supporting roof and sides; boring against old workings; shot-firing.

b. Ventilation: The properties, identification and practical estimation of gases met with in mines; natural ventilation, fans and other ventilators. The distribution and control of air underground; construction, use and testing of safety-lamps.

c. Explosions in mines, underground fires and inundations, their causes and prevention. Coal-dust; spontaneous heating; rescue operations, apparatus and organization.

d. Machinery and plant in common use in or about a mine, including the use of electricity with special reference to safety.

e. Elementary surveying and levelling; preliminary course in mathematics.

f. The Mine Act and Rules; writing of reports.

3. Preparation for Mine Manager's Standing—First Class Certificate:

A.—Practical Work.

1. Sinking; Prospecting for coal; location of shaft or slope; relative advantages of each; system of laying out and timbering under varying circumstances, of coal and other stratified deposits included under The Mines Act; buckets, ships or cages, guides and crossheads; scaffolds; special modes of sinking in soft or wet or running ground; surface arrangements, supplies and general precautions in sinking.

2. Methods of Working: Laying out pit-bottom, size of shaft pillars, direction of main roads; tools and appliances used underground; boring machines, drilling machines, pick machines, disc and chain undercutting machines; explosives and electric firing; special methods of breaking down coal; choice of methods as regulated by the various factors, thickness and inclination of seam, cleft and type of coal, shape of property, liability to spontaneous combustion, faults, condition of roof and floor, depth of workings, etc., robbing pillars, driving to coal beyond faults, weighting on face, size of pillars and rooms, longwall retreating and advancing; illustration of methods of working from Alberta collieries and from those elsewhere; special methods of working highly inclined, contiguous and very thick seams.

3. Supporting Excavations: Effects of thrust and creep; different methods of timbering levels; proper angle to set props; methods of supporting with steel, reinforced concrete, masonry; spiling in loose ground; spragging of face; timbering of longwall face; drawing of props.

4. Haulage: Mine cars, rails, curves and grades; resistance to traction, tramping, horse haulage, inclines, back balances; main and tail rope; endless rope; electric locomotives; compound air locomotives; general care and upkeep of haulage facilities.

5. Pumping: Siphon; kinds of pumps, steam and compressed air, centrifugal and turbine electric pumps; water shafts and arrangements for hoisting water; adaptations employed in handling acids and gritty water; water rumps and standages; special precautions in driving towards and tapping bodies of water; wooden, masonry and concrete dams; calculations of size of pump, horsepower, etc., to handle given amount of water.

6. Winding: Head frame, winding pulleys, etc., tubs, skips and cages; safety attachments; calculation of proper size of rope for certain conditions of winding; methods of capping and splicing of ropes; inspection and care of ropes; hoisting engine for definite output; direct-acting and second-motion engines; compensation by balance rope, flat rope with reel, drawn and taper rope; cage indicators; steam and lever brakes; detaching hooks.

7. Surface arrangements: Location of engines, boilers, bank-head, tracks, etc., picking belts and tables; tipples, screens, pockets, etc., coal washers.

B.—Ventilation.

1. Theory: The physical and chemical properties of the gases commonly met with in coal mines; chemistry of explosions; explosive limits of mixtures of fire damp and air, and influence of other gases and coal dust on the same; sources and effects of heat in mines; laws of ventilation; friction of air in mines; the distribution and control of air underground; formulae; transposition, substitution, and solving of formulae; solving of practical problems illustrating the different conditions in ventilating coal mines.

2. Practice: Natural ventilation; furnace ventilation; ventilating fans; construction and practical operation of different fans; fan engines and motors; surface arrangement of fans and openings; ventilating workings; doors; regulators; brattice; air openings; lighting; illumination of pit bottom; naked lights; forms of safety lamps; use and care of lamps; illuminating oils; locks; relighting devices; fire-damp indicators; electric lamps. Gases; outbursts; spontaneous combustion; blown out shots; coal dust; precautions against fires and explosions; brushing gas out of pockets and old workings; sealing off fires; adaptation to method of opening out and working; precautions in approaching old workings; rescue work after an explosion.

C.—Surveying.

Surveying, Levelling and Drawing: Determination of magnetic declination; loose and fast needle surveying underground and on the surface; calculation of areas and volumes; contour lines and levelling; connecting of surface and underground surveys; triangulation; plotting by protractor and co-ordinates; mine plans and sections; the use, care and testing of instruments.

D.—Geology.

Stratified rock and other stratified formation—outstrike and dip of beds—monoclinical, anticlinal and synclinal domes—synclinal basins—coal beds; rolls; unconformities—normal and reverse faults—dumb faults or washouts—rules for finding continuation of seam beyond faults—cleavage or rock—cleat, lype and reed coal.

E.—General Management and Mining Legislation.

Organization and general surface arrangements under varying conditions; The Mines Act and Orders, and other legislation applied to mines under The Mines Act.

Reference Books and Periodicals.

1. First Lessons in Coal Mining (Wm. Glover). Published by Crosby, Lockwood & Sons, Stationers, Hall Court, London.
2. The Theory and Practice of Mine Ventilation (Tate). Crosby, Lockwood & Sons.

3. Mine Gases and Gas Testing (McTrusty). Science & Office of Mining Office, Wiggin, England.
4. Text-Book on the Steam Engine and on Gas Engines (Goodee). Crosby Lockwood & Sons.
5. Coal Mining (Cockin). Crosby, Lockwood & Sons.
6. Mining Formulae and Their Application (O'Donahue), published by "C.M.A." Office, Leigh, England.
7. Plans and Sketches of Practical Ventilation and Coal Working in Mines (Tate). Published by Office of "The Science and Art of Mining", Rowbottam Square, Wiggin, England.
8. Practical Coal Mining, Vol. 1-6 (Boulton). Published by the Gresham Publishing Co., 34 Southampton St., Strand, London.
9. The Mechanical Engineering of Collieries (Futers). Published by the Colliery Guardian Co. Ltd., 30-31 Furnival St., Holborn, E.C. London.
10. Text-Books of International Text Book Co. on Coal Mining and related subjects, Scranton, Pa.
11. "The Coal Age," 10th Ave. & 36th St., New York.
12. "The Colliery Guardian", 30-31 Furnival St., Holborn, E.C. London.



